Safety data sheet for product

1. PRODUCT AND COMPANY IDENTIFICATION

- Product name: Lithium ion battery cell
- Product code: None (All models Sanyo manufactured and whose capacity is less than or equal to 4.95Ah)
- Company name: Sanyo Electric Co., Ltd. Mobile Energy Company
- Address: 222-1 , Kaminaizen, Sumoto City, Hyogo, Japan
- Telephone number: +81-799-24-4111
- Fax number: +81-799-24-4121
- Emergency telephone number: [Weekday] +81-799-23-3942
  [Night and holiday] +81-799-24-4131

2. COMPOSITION / INFORMATION ON INGREDIENTS

- Substance or preparation: Preparation
- Information about the chemical nature of product: *1

Common chemical name / General name	CAS number	Classification and hazard labeling
Lithium transition metal oxidate ($Li[M]_m[O]_n$ *2)	12190-79-3 12057-17-9 182442-95-1	
Iron	7439-89-6	
Aluminum	7429-90-5	
Graphite (Natural graphite) (Artificial graphite)	 7782-42-5 7440-44-0	
Copper	7440-50-8	
Organic electrolyte	-	Inflammable liquid

**1 Not every product includes all of these materials.*

**2 The letter M means transition metal and candidates of M are Co, Mn and Ni. One compound includes one ore more of these metals and one product includes one or more of the compounds.*
The letter m and n means the number of atoms.

3. HAZARDS IDENTIFICATION

For the battery cell, chemical materials are stored in a hermetically sealed metal case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage.

However, if exposed to a fire, added mechanical shocks, decomposed, added electric stress by miss-use, the gas release vent will be operated. The battery cell case will be breached at the extreme, hazardous materials may be released.

Moreover, if heated strongly by the surrounding fire, acrid gas may be emitted.

- Most important hazard and effects

  Human health effects:

  Inhalation: The steam of the electrolyte has an anesthesia action and stimulates a respiratory tract.
  Skin contact: The steam of the electrolyte stimulates a skin. The electrolyte skin contact causes a sore and stimulation on the skin.
  Eye contact: The steam of the electrolyte stimulates eyes. The electrolyte eye contact causes a sore and stimulation on the eye. Especially, substance that causes a strong inflammation of the eyes is contained.

  Environmental effects: Since a battery cell remains in the environment, do not throw out it into the environment.

- Specific hazards:

  If the electrolyte contacts with water, it will generate detrimental hydrogen fluoride.
  Since the leaked electrolyte is inflammable liquid, do not bring close to fire.

4. FIRST-AID MEASURES

Spilled internal cell materials

- Inhalation:
  Make the victim blow his/her nose, gargle. Seek medical attention if necessary.
- Skin contact:
  Remove contaminated clothes and shoes immediately. Wash extraneous matter or contact region with soap and plenty of water immediately.
- Eye contact:
  Do not rub one's eyes. Immediately flush eyes with water continuously for at least 15 minutes. Seek medical attention immediately.

A battery cell and spilled internal cell materials

- Ingestion:
  Make the victim vomit. When it is impossible or the feeling is not well after vomiting, seek medical attention.

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5. FIRE-FIGHTING MEASURE

- Suitable extinguishing media: Plenty of water, carbon dioxide gas, nitrogen gas, chemical powder fire extinguishing medium and fire foam.
- Specific hazards: Corrosive gas may be emitted during fire.
- Specific methods of fire-fighting: When the battery burns with other combustibles simultaneously, take fire-extinguishing method which correspond to the combustibles. Extinguish a fire from the windward as much as possible.
- Special protective equipment for firefighters:
  Respiratory protection: Respiratory equipment of a gas cylinder style or protection-against-dust mask
  Hand protection: Protective gloves
  Eye protection: Goggle or protective glasses designed to protect against liquid splashes
  Skin and body protection: Protective cloth

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6. ACCIDENTAL RELEASE MEASURES

Spilled internal cell materials, such as electrolyte leaked from a battery cell, are carefully dealt with according to the followings.

- Precautions for human body:
  Remove spilled materials with protective equipment (protective glasses and protective gloves). Do not inhale the gas as much as possible. Moreover, avoid touching with as much as possible.
- Environmental precautions: Do not throw out into the environment.
- Method of cleaning up: The spilled solids are put into a container. The leaked place is wiped off with dry cloth.
- Prevention of secondary hazards: Avoid re-scattering. Do not bring the collected materials close to fire.

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7. HANDLING AND STORAGE

- Handling
  Technical measures:
    Prevention of user exposure: Not necessary under normal use.
    Prevention of fire and explosion: Not necessary under normal use.
  Precaution for safe handling: Do not damage or remove the external tube.
  Specific safe handling advice: Never throw out cells in a fire or expose to high temperatures. Do not soak cells in water or seawater. Do not expose to strong oxdizers. Do not give a strong mechanical shock or fling. Never disassemble, modify or deform. Do not connect the positive terminal to the negative terminal with electrically conductive material. Do not use in the place temperature can be high. In the case of charging, use only dedicated charger or charge according to the conditions specified by Sanyo.
- Storage
  Technical measures:
    Storage conditions (suitable, to be avoided): Avoid direct sunlight, high temperature, high humidity. Store in cool place (temperature: -20 ~ 35 degree C, humidity: 45 ~ 85%).
    Incompatible products: Conductive materials, water, seawater, strong oxidizers and strong acids
    Packing material (recommended, not suitable): Insulative and tear proof materials are recommended.

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8. EXPOSURE CONTROLS / PERSONAL PROTECTION

- Engineering measures:
  No engineering measure is necessary during normal use. In case of internal cell materials' leakage, operate the local exhaust or improve ventilation.
- Control parameters

Common chemical name / General name	ACGIH (2009) TLV-TWA	ACGIH (2009) BEI
Lithium transition metal oxidate	0.02mg/m^3 (as cobalt) * 0.2mg/m^3 (as manganese) * 0.2 mg/m^3 (as nickel) *	-
Aluminum	10mg/m^3 (metal coarse particulate) 5mg/m^3 (inflammable powder) 5mg/m^3 (weld fume)	-
Carbon (Natural graphite) (Artificial graphite)	2mg/m^3 (inhalant coarse particulate)	-
Copper	0.2mg/m^3 (fume) 1.0mg/m^3 (a coarse particulate, Mist)	-
Organic electrolyte	-	-

ACGIH: American Conference of Governmental Industrial Hygienists, Inc.
TLV-TWA: Threshold Limit Value-Time Weighted Average concentration
BEI: Biological Exposure Indices
* *Not every product includes all of these metals.*

- Personal protective equipment
  Respiratory protection: Respirator with air cylinder, dust mask
  Hand protection: Protective gloves
  Eye protection: Goggle or protective glasses designed to protect against liquid splashes
  Skin and body protection: Working clothes with long sleeve and long trousers

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9. PHYSICAL AND CHEMICAL PROPERTIES

- Appearance
  Physical state: Solid
  Form: Cylindrical or Prismatic or Prismatic (laminated)
  Color: Metallic color or black(without tube if it has tube)
  Odor: No odor
- pH: NA
- Specific temperatures/temperature ranges at which changes in physical state occur:
  There is no useful information for the product as a mixture.
- Flash point: NA
- Explosion properties: NA
- Density: NA
- Solubility ,with indication of the solvent(s): Insoluble in water

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10. STABILITY AND REACTIVITY

- Stability: Stable under normal use
- Hazardous reactions occurring under specific conditions
  - Conditions to avoid: When a battery cell is exposed to an external short-circuit, crushes, deformation, high temperature above 100 degree C, it will be the cause of heat generation and ignition. Direct sunlight and high humidity.
  - Materials to avoid: Conductive materials, water, seawater, strong oxidizers and strong acids.
  - Hazardous decomposition products: Acrid or harmful gas is emitted during fire.

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11. TOXICOLOGICAL INFORMATION

There is no available data on the product itself. The information of the internal cell materials is as follows.

Lithium transition metal oxidate - $Li[M]_m[O]_n$

- Acute toxicity: No applicable data.
  Reference cobalt: LDLo, oral - Guinea pig 20mg/kg
  manganese: LD50, oral - Guinea pig 9000mg/kg
  nickel: LDLo, oral - Guinea pig 5mg/kg
- Local effects: Unknown.
- Sensitization:
  The nervous system of respiratory organs may be stimulated sensitively.
- Chronic toxicity/Long term toxicity:
  By the long-term inhalation of coarse particulate or vapor of cobalt, it is possible to cause the serious respiratory-organs disease. Skin reaction or a lung disease for allergic or hypersensitive person may be caused.
  Cobalt compounds belong to the 2B group of the carcinogen in the IARC category (substance which is suspected to have carcinogenic to man).
  By the long-term or repetitive inhalation of coarse particulate of Manganese Oxide (MnO_2), lungs and nervous system may be affected; bronchitis, pneumonia, nerve disease or nerve mental disorder (manganese poisoning) may be caused.
  Nickel Compounds belong to the 1st group of the carcinogen in the IARC category (substance which has carcinogenic to man).
- Skin causticity: Although it is very rare, the rash of the skin and allergic erythema may result.
  * *Not every product includes all of these metals.*

Aluminum

- Local effects: Aluminum itself has no toxicity. When it goes into a wound, dermatitis may be caused.
- Chronic toxicity/Long term toxicity: By the long-term inhalation of coarse particulate or fume, it is possible to cause lung damage (aluminum lungs).

Graphite

- Acute toxicity: Unknown.
- Local effects: When it goes into one’s eyes, it stimulates one’s eyes; conjunctivitis, thickening of corneal epithelium or edematous inflammation palpebra may be caused.
- Chronic toxicity/Long term toxicity:
  Since the long-term inhalation of high levels of graphite coarse particulate may become a cause of a lung disease or a tracheal disease.
- Carcinogenicity:
  Graphite is not recognized as a cause of cancer by research organizations and natural toxic substance research organizations of cancer.

Copper

- Acute toxicity:
  60-100mg sized coarse particulate causes a gastrointestinal disturbance with nausea and inflammation.
  TDLo, hypodermic - Rabbit 375mg/kg
- Local effects:
  Coarse particulate stimulates a nose and a tracheal.
  When it goes into one’s eyes, the symptom of the reddening and the pain is caused.
- Sensitization: Sensitization of the skin may be caused by long-term or repetitive contact.

Organic Electrolyte

- Acute toxicity:
  LD_{50}, oral - Rat 2,000mg/kg or more
- Local effects: Unknown.
- Skin irritation study: Rabbit - Mild
- eye irritation study: Rabbit - Very severe

12. ECOLOGICAL INFORMATION

- Persistence/degradability:
  Since a battery cell and the internal materials remain in the environment, do not bury or throw out into the environment.

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13. DISPOSAL CONSIDERATIONS

- Recommended methods for safe and environmentally preferred disposal:

Product (waste from residues)

Specified collection or disposal of lithium ion battery is required by the law like as "battery control law" in several nations. Collection or recycle of the battery is mainly imposed on battery's manufacturer or importer in the nations recycle is required.

Contaminated packaging

Neither a container nor packing is contaminated during normal use. When internal materials leaked from a battery cell contaminates, dispose as industrial wastes subject to special control.

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14. TRANSPORT INFORMATION

In the case of transportation, avoid exposure to high temperature and prevent the formation of any condensation. Take in a cargo of them without falling, dropping and breakage. Prevent collapse of cargo piles and wet by rain. The container must be handled carefully. Do not give shocks that result in a mark of hitting on a cell. Please refer to Section 7-HANDLING AND STORAGE also.

UN regulation

- ID number: 3480
- Proper shipping name:
  Lithium ion batteries
- Class: 9 *
- Packing group: II *

** However this product is defined as above, it is **not** recognized as "DANGEROUS GOODS" when its transport condition accords with instructions or provisions depend on region and transportation mode. About the instructions or provisions, please see descriptions in box brackets of following regulations.*

Regulation depends on region and transportation mode

- Worldwide, air transportation:
  IATA-DGR ["packing instruction 965 section II")
- Worldwide, sea transportation:
  IMO-IMDG Code [special provision 188]
- Europe, road transportation:
  ADR [special provision 188]

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15. REGULATORY INFORMATION

- Regulations specifically applicable to the product:
  Wastes Disposal and Public Cleaning Law [Japan]
  Law for Promotion of Effective Utilization of resources [Japan]
  US Department of Transportation 49 Code of Federal Regulations [USA]

** About overlapping regulations, please refer to Section 14-TRANSPORT INFOMATION.*

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16. OTHER INFORMATION

- This safety data sheet is offered an agency who handles this product to handle it safely.
- The agency should utilize this safety data sheet effectively (put it up, educate person in charge) and take proper measures.
- ***The information contained in this Safety data sheet is based on the present state of knowledge and current legislation.***
- This safety data sheet provides guidance on health, safety and environmental aspects of the product and should not be construed as any guarantee of technical performance or suitability for particular applications.

Reference

Chemical substances information: Japan Advanced Information center of Safety and Health
International Chemical Safety Cards (ICSCs): International Occupational Safety and Health Information Centre (CIS)
Dangerous Goods Regulations – 52nd Edition Effective 1 January 2011: International Air Transport Association (IATA)
IMDG Code - 2010 Edition: International Maritime Organization (IMO)
The European Agreement concerning the International Carriage of Dangerous Goods by Road - 2009: The United Nations Economic Commission for Europe (UNECE)
RTECS (CD-ROM)
MSDS of raw materials prepared by the manufactures

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